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INTRODUCTION

On 22 December 1989, the United Nations General Assembly called for a global meeting that would devise strategies to halt and reverse the effects of environmental degradation "in the context of increased national and international efforts to promote sustainable and environmentally sound development in all countries".

Agenda 21, adopted by the United Nations Conference on Environment and Development on 14 June 1992, is the international community's response to that request. It is a comprehensive programme of action to be implemented — from now and into the twenty-first century — by Governments, development agencies, United Nations organizations and independent sector groups in every area where human (economic) activity affects the environment.

The programme should be studied in conjunction with the Rio Declaration on Environment and Development and the principles for the sustainable management of forests. These were also adopted at the Conference, known as the Earth Summit, which was held from 3 to 14 June 1992 in Rio de Janeiro, Brazil.

Underlying Agenda 21 is the notion that humanity has reached a defining moment in its history. We can continue our present policies which serve to deepen the economic divisions within and between countries; which increase poverty, hunger, sickness and illiteracy worldwide; and which are causing the continued deterioration of the ecosystem on which we depend for life on Earth.

Or we can change course. We can improve the living standards of those who are in need. We can better manage and protect the ecosystem and bring about a more prosperous future for us all. "No nation can achieve this on its own," states Mr. Maurice Strong, Secretary-General of the Conference, in the preamble to Agenda 21. "Together we can — in a global partnership for sustainable development."

This press summary is not an official document. It has been issued to help journalists become familiar with the programme adopted by Governments. It was prepared by the Communications and Project Management Division, Department of Public Information, as part of the United Nations information programme on sustainable development.

The complete text of Agenda 21 can be found in document A/CONF.151/26, Vols. I-III and will also be issued as a UN Sales Publication.

INTERNATIONAL COOPERATION TO ACCELERATE SUSTAINABLE DEVELOPMENT IN DEVELOPING COUNTRIES

(Section I, Chapter 2 of Agenda 21)

Policies that affect trade and the flow of global finances have a major impact on sustainable development. Developing countries are weighed down with external indebtedness, inadequate development finance, barriers to Northern markets and falling prices for the commodities which dominate many economies in terms of production, employment and export earnings.

Agenda 21 proposals in this area aim to liberalize trade, make trade and environment mutually supportive, provide adequate financial resources, deal with international debt and encourage macro-economic policies conducive to environment and development.

Removing distortions in international trade is essential, in particular substantial and progressive reduction in support and protection of agriculture — covering internal regimes, market access and export subsidies. In this and other sectors, including industry, protectionism should be stopped and tariff and non-tariff barriers should be removed. Developing countries should diversify their economies in order to reduce dependence on commodity exports.

Environment and trade policies should be mutually supportive. Some environmental standards valid for developed countries may have unwarranted costs in developing countries. The role of the General Agreement on Tariffs and Trade (GATT) should be clarified. Industry should be encouraged to play a constructive role. Environmental concerns should not be used as an excuse for restraining trade.

Sustainable development requires increased investment in developing countries, and the efficient use of financial resources. Many developing countries have experienced a decade-long negative net transfer of financial resources, mostly for debt-servicing. Macro-economic conditions that encourage a stable and predictable international economic environment should be encouraged, including stable interest and key exchange rates, stimulation of savings and reduction of fiscal deficits. Countries should remove barriers caused by bureaucratic inefficiencies, encourage the private sector and foster entrepreneurship.

Proposed activities to promote sustainable development through trade during 1993-2000 would cost an estimated \$8.8 billion from the international community on grant or concessional terms. Technical cooperation on macro-economic policies would cost \$50 million annually.

COMBATING POVERTY

(Section I, Chapter 3 of Agenda 21)

Poverty is a complex multidimensional problem with both national and international origins. No one solution will apply globally; country-specific programmes are crucial. The eradication of poverty and hunger, greater equity in income distribution and human resources development remain major challenges everywhere. All countries must cooperate and share responsibility.

Agenda 21 proposals cover population policies, health care and education, the rights of women and the role of young people, indigenous people and local communities in order to enable all people to achieve sustainable livelihoods. Policies need to simultaneously address development, sustainable resource management and poverty eradication.

Governments should, among other things, support a community-driven approach to sustainability by empowering local and community groups; generate employment by giving high priority to basic education and professional training; and set up an effective primary and maternal health care system accessible to all.

Women should have full participation in decision-making. Women and men should have the same right to decide freely and responsibly on the number and spacing of their children. Health facilities should include women-centred, women-managed reproductive health care services, including pre-natal care. Women should be able to fully breast-feed at least during the first four months after birth.

Food security should be promoted as part of sustainable agriculture. The urban poor should be given credit; and the landless poor provided with access to land and natural resources and the means of production. The poor should have access to fresh water and sanitation.

Activities to combat poverty will cost an estimated \$30 billion annually between 1993 and 2000, including about \$15 billion from the international community on grant or concessional terms. This overlaps estimates in other parts of Agenda 21.

CHANGING CONSUMPTION PATTERNS

(Section I, Chapter 4 of Agenda 21)

Poverty and environmental degradation are closely interrelated. While poverty results in environmental stress, the major cause of global environmental deterioration is an unsustainable pattern of consumption and production, particularly in the industrialized countries, which aggravates poverty and imbalances.

Achieving sustainable development will require efficiency in production and changes in consumption in order to optimize resource use and minimize the creation of waste. This will require reorienting patterns of development in industrial societies which have been copied in much of the developing world.

Proposals in Agenda 21 call for greater attention to issues around consumption and for new national policies to encourage the shift to sustainable consumption patterns. Other chapters of Agenda 21 address related issues such as energy, transportation, wastes, economic instruments and the transfer of environmentally sound technology.

All countries, led by developed countries, should strive to promote sustainable consumption patterns. If developing countries are to avoid environmentally hazardous levels of consumption, they will require access to improved technology and other assistance from industrialized countries.

More research on consumption is needed. Some economists question traditional concepts of economic growth and underline the importance of pursuing economic objectives which take account of the full value of natural resources.

New concepts of wealth and prosperity should be developed which allow higher standards of living through changed lifestyles that are less dependent on the Earth's finite resources and more in harmony with its carrying capacity. This idea should be reflected in new systems of national accounts and other indicators of sustainable development.

To encourage greater efficiency in the use of energy and resources, governments should reduce the amount of energy and materials used per unit in the production of goods and services, promote the dissemination of existing environmentally sound technologies, promote research and development in environmentally sound technologies, assist developing countries in using these technologies and encourage the use of new and renewable sources of energy and natural resources.

To minimize the generation of wastes, Governments, together with industry, households and the public, should encourage industrial recycling, reduce wasteful packaging and promote environmentally sound products. Governments can exercise leadership through their own purchasing power.

Environmentally sound pricing policies (environmental charges, taxes and other mechanisms) which make clear to producers and consumers the costs of energy, materials, natural resources and the generation of wastes, can help to achieve significant changes in consumption and production patterns.

DEMOGRAPHIC DYNAMICS AND SUSTAINABILITY

(Section I, Chapter 5 of Agenda 21)

The growth of world population and production combined with unsustainable consumption patterns has put increasingly severe stress on the life-supporting capacity of the planet, and has affected the use of land, water, air, energy and other resources.

There is a need to develop strategies to mitigate both the adverse impact on the environment of human activities as well as the adverse impact of environmental change on human populations.

Agenda 21 proposes that population factors be thoroughly researched. A better understanding is needed of the relationships among demographic dynamics, technology, cultural behaviour, natural resources and life support systems. International education on the urgency of population issues should be improved.

Population concerns should be more fully integrated into national planning, policy and decision-making. Policies should combine environmental concerns and population issues in a holistic view of development. The primary goals should include alleviation of poverty; secure livelihoods; good health; quality of life; improvement of the status and income of women, their access to schooling and professional training and fulfilment of their personal aspirations; and empowerment of individuals and communities.

Since large increases in the size and number of cities will occur in developing countries under any likely population scenario, greater attention should be given to improved municipal management and local government.

To implement population programmes, Governments, local communities, women's organizations and non-governmental organizations need to develop a framework for action that allows for full community involvement in decision-making. Reproductive health programmes and services should be developed and enhanced to reduce maternal and infant mortality and enable women and men to fulfil their aspirations in terms of family size.

An estimated \$7 billion is needed annually for population activities during 1993-2000, including about \$3.5 billion from the international community on grant or concessional terms. Also needed annually from international sources is about \$90 million to assess the implications of national demographic trends and factors, and about \$10 million to research the links between population and sustainable development.

PROTECTING AND PROMOTING HUMAN HEALTH

(Section I, Chapter 6 of Agenda 21)

Sound development is not possible without a healthy population. Most development activities affect the environment in a way that often causes or exacerbates health problems. At the same time, a lack of development adversely affects the health of many people.

Proposals in Agenda 21 focus on meeting primary health care needs, controlling communicable diseases, coping with urban health problems, reducing health risks from environmental pollution and protecting vulnerable groups such as infants, women, indigenous peoples and the very poor. Education, housing and public works should be part of an overall strategy for achieving health for all by the year 2000.

Governments should build basic health infrastructures, paying particular attention to the provision of safe water and food supplies, sanitation services, proper nutrition, health education, immunization and essential drugs. The transfer of health-care technology, training of personnel and capacity-building are also needed.

Environmental control measures are indispensable, especially in the area of water supply and sanitation, in order to curb many communicable diseases including cholera, malaria, schistosomiasis and diarrhoeal diseases.

HIV infection levels are expected to reach 30-40 million people by the year 2000. This will strain health care resources in many developing countries and have an increasingly devastating impact on women and children. Proposals call for the mobilization of all countries to prevent HIV infection.

Proposals for protecting infants and children call for strengthening services such as prenatal care, breast-feeding and immunization and nutrition programmes and undertaking adult education on disease prevention and treatment (such as the use of oral rehydration therapy for diarrhoea).

For municipal and local governments overwhelmed by urban health problems, the global objective is to achieve, by the year 2000, a 10 to 40 per cent improvement in health indicators for infant mortality, maternal mortality, percentage of low birth-weight newborns and specific indicators (e.g. tuberculosis as an indicator of crowded housing). The emphasis should be on strengthening "enabling strategies" that emphasize "doing with" rather than "doing for." Programmes should promote community involvement, public education and collaboration among various agencies.

Among the actions suggested for minimizing the hazards from pollution of the environment, workplaces and individual dwellings:

- ▶ developing technologies to control and prevent water and air pollution, including indoor air pollution;
- ▶ limiting the use of pesticides;
- ▶ improving solid waste disposal;
- ▶ promoting the introduction of environmentally sound technologies in the industry and energy sectors;
- ▶ encouraging industrial hygiene programmes;
- ▶ monitoring noise pollution;
- ▶ studying the health effects of ultraviolet radiation, which increasingly results from depletion of the stratospheric ozone layer.

The estimated annual cost (1993-2000) of Agenda 21 health proposals are as follows.

- ▶ To meet primary health care needs: \$40 billion, of which \$5 billion would come from the international community on grant or concessional terms.
- ▶ To control communicable diseases: \$4 billion, including \$900 million from international sources on grant or concessional terms.
- ▶ To protect vulnerable groups: \$3.7 billion, including \$400 million from international sources on grant or concessional terms.
- ▶ To cope with urban health problems: \$222 million, including \$22 million in international grants or concessional financing.
- ▶ To reduce the health risk from environmental pollution: about \$3 billion, including \$115 million in international grants or concessional funding.

PROMOTING SUSTAINABLE HUMAN SETTLEMENTS

(Section I, Chapter 7 of Agenda 21)

Agenda 21 proposals for improving the social, economic and environmental quality of human settlements and the living and working environments of all people, in particular the urban and rural poor, focus on planning and management methods in several programme areas:

- ▶ **Providing adequate shelter** — At least 1 billion people do not have access to safe and healthy shelter. The Global Strategy for Shelter to the Year 2000, adopted by the UN General Assembly in 1988, needs greater political and financial support.

► **Improving management of urban settlements** — By the turn of the century, the majority of the world's population will be living in cities. Despite their problems, urban areas generate 60 per cent of gross national product and can develop the capacity to sustain their productivity.

Countries should, among other things, accelerate efforts to reduce urban poverty, improve infrastructure and train a cadre of managers, technicians and administrators. To counter mass migration to crowded cities, rural employment opportunities and "intermediate cities" should be developed.

► **Promoting sustainable land-use planning and management** — Countries should make an inventory of their land resources and classify them according to most appropriate uses; environmentally fragile or disaster-prone areas should be identified for special protection measures.

Land-resource development policies should reflect the needs of all sectors of the population, particularly indigenous peoples, women, local communities, low-income urban dwellers and the rural poor.

► **Providing environmentally sound infrastructure facilities** — The sustainability of urban development depends greatly on the availability of water supplies, air quality, drainage, sanitation services and disposal of hazardous and solid wastes.

Countries should integrate infrastructure and environmental planning by the year 2000 so that they can provide such facilities by the year 2025.

► **Promoting energy-efficient technology, alternative and renewable energy sources and sustainable transport systems** — Transport accounts for 30 per cent of commercial energy consumption. Developing countries should promote reforestation for biomass energy and increased use of solar, hydro and wind energy sources.

All countries should adopt urban transport plans favouring high-occupancy public transport; encourage non-motorized modes of transport by providing safe cycleways and footways; and encourage development patterns which reduce transport demand.

► **Enabling disaster-prone countries to plan for and recover from natural disasters** — Over the past two decades, natural disasters are estimated to have caused some 3 million deaths and affected 800 million people. Global economic losses are estimated at \$30-50 billion a year.

Countries should develop a "culture of safety" through public education. Pre-disaster planning should include researching the risks of human settlement patterns, industries, toxic wastes and other activities and creating a corps of scientists and engineers to serve as emergency specialists. Post-disaster reconstruction and rehabilitation will require partnership with the international community.

► **Promoting sustainable construction industry activities** — The construction sector can assist in achieving many human settlement goals, including shelter, infrastructure and employment. At the same time, it can deplete natural resources, degrade fragile eco-zones, cause chemical pollution and injure human health by using hazardous building materials.

Countries should promote industries using indigenous building materials (based on locally available natural resources), energy-efficient designs and technologies, and labour-intensive construction and maintenance technologies to generate employment and upgrade the technical and managerial capacities of small entrepreneurs.

- Promoting human resource development and capacity-building in all the above programme areas.

Estimated annual costs (1993-2000) for human settlement programmes are as follows.

- To provide adequate shelter: \$75 billion, including \$10 billion from international sources on grant or concessional terms.

- To improve urban infrastructure and municipal services in developing countries: \$100 billion, including \$15 billion from international sources on grant or concessional terms.

- To promote sustainable land use: \$3 billion, including \$300 million from international sources on grant or concessional terms.

- Technical assistance to provide environmental infrastructure: \$50 million in international grants or concessional funding (infrastructure costs are estimated in other chapters).

- To promote energy efficiency: financing is included in the estimates for Chapter 9 (atmosphere).

- External assistance for post-disaster investment: \$50 million from international sources on grant or concessional terms.

- For sustainable construction industry activities: \$40 billion, including \$4 billion in international grants or concessional funding.

- To promote human resource development: \$65 million from international sources on grant or concessional terms.

Note: Problems caused by human settlements are linked to issues of health (Chapter 6 of Agenda 21), atmosphere (Chapter 9), water (Chapter 18) and solid wastes and sewage (Chapter 21).

POLICY-MAKING FOR SUSTAINABLE DEVELOPMENT

(Section I, Chapter 8 of Agenda 21)

Decision-making in many countries tends to separate economic, social and environmental factors. Countries can no longer afford to make decisions without considering environment and development issues; a fundamental reshaping of the planning process may be necessary.

Agenda 21 proposes the full integration of environmental and developmental issues for government decision-making on economic, social, fiscal, energy, agricultural, transportation, trade and other policies. Governments should also seek a broader range of public participation.

Integrating environmental issues into policy-making will require more extensive information-gathering and improved ways for assessing environmental risks and benefits. Management techniques should be flexible enough to accommodate multiple goals and changing needs. Planning and management responsibilities should be delegated to the lowest levels of public authority, and indigenous methods of managing natural resources should be considered wherever possible.

Country-specific laws and regulations are among the most important instruments for transforming environment and development policies into action, not only through "command and control" methods but also as a framework for economic planning and market instruments.

However, many laws are *ad hoc* and piecemeal or lack the necessary institutional machinery and enforcement authority. Developing countries need help in drafting effective legislation, enforcing laws, creating judicial procedures, complying with international agreements and training their own experts in environmental law.

Prices, markets and government fiscal and economic policies play a complementary role in environmental policy-making. Environment costs should be incorporated in the decisions of producers and consumers, in order to reverse the tendency to treat the environment as a "free good" and to pass these costs on to other parts of society, other countries or to future generations.

Prices should reflect the scarcity and total value of resources and contribute toward preventing environmental degradation. Subsidies which do not conform with sustainable development objectives should be reduced or removed. New markets in pollution control and environmentally sound resource management should be created.

Governments should cooperate with business and industry to make use of economic instruments and market mechanisms to deal with energy, transport, agriculture, forestry, water, wastes, health, global and transboundary issues and technology transfer. Businesses and industries with expertise in environmental matters, including transnational corporations, should organize training programmes for the private sector and other groups.

Integrated environmental and economic accounting (IEEA) systems should be established in all countries. Better ways should be developed for measuring the value of natural resources and other services provided by the environment. National accounts should be expanded to accommodate IEEA as a complement to traditional national accounting practices.

The annual cost (1993-2000) of implementing these proposals is estimated at \$63 million from the international community on grant or concessional terms.

PROTECTING THE ATMOSPHERE: MAKING THE ENERGY TRANSITION

(Section II, Chapter 9 of Agenda 21)

To protect the atmosphere, Agenda 21 focuses on four programme areas: (1) uncertainties in related scientific knowledge; (2) sustainable development in regard to energy, transport, industry, and land and marine resources; (3) stratospheric ozone depletion; and (4) transboundary air pollution.

Proposals in this chapter do not oblige any Government to exceed the provisions of the 1985 Vienna Convention for the Protection of the Ozone Layer, the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer (as amended in 1990) or the 1992 United Nations Framework Convention on Climate Change.

To address concerns over climate change and variability, air pollution and ozone depletion, better scientific understanding is needed of the various natural, economic and social processes that affect or are affected by the atmosphere.

Research and more extensive climatic observation should be promoted. There should be greater cooperation in: detecting and predicting atmospheric changes, and assessing their environmental and socio-economic impacts; identifying dangerous levels of pollutants and greenhouse gases; and building scientific capacities and exchanging atmosphere-related data and information.

Activities in this area will require an estimated \$640 million per year (1993-2000) in international grants or concessional financing.

Energy is essential to economic and social development and improved quality of life. But current practices of production, transmission, distribution and consumption cannot sustainably meet increased needs. Controlling emissions of greenhouse gases will require greater efficiency, and increasing reliance on new and renewable energy sources. All energy use needs to respect the atmosphere, human health and the environment as a whole.

Developing countries need adequate fuel supplies to increase energy use. Some countries are highly dependent on income from the production, processing and export of fossil fuels, and it is difficult for many countries to switch to alternative fuels.

Agenda 21 proposals in regard to energy include the following:

- ▶ Cooperation in identifying economically viable, environmentally sound energy sources for sustainable development in developing countries.
- ▶ Use of environmental impact assessments and other national measures for sustainably integrating energy, environmental and economic policy decisions.
- ▶ Development and transfer of technologies for energy-efficiency, especially to modernize power systems, and for new and renewable energy systems.
- ▶ Regional coordination of energy plans and studies to determine the feasibility of distributing energy from new and renewable sources.
- ▶ Nationally appropriate administrative, social and economic measures to improve energy efficiency.
- ▶ Appropriate national efficiency and emission standards promoting technologies that minimize adverse environmental impacts.
- ▶ Product-labelling, in cooperation with the private sector, to inform decision-makers and consumers about opportunities for energy efficiency.

To limit, reduce or control atmospheric emissions from the transport sector, traffic and transport systems need to be better designed and managed. Cost-effective, more efficient, less polluting and safer rural and urban mass transit should be developed and promoted, along with environmentally sound road networks. Technology transfer, and the collection and exchange of relevant information, should be strengthened. National transport and settlement planning should be integrated.

Industrial development is essential for economic growth but industry is a major user of resources and producer of air emissions. To minimize pollution and damage to the atmosphere, Agenda 21 calls for national administrative, social and economic measures, where appropriate, that will encourage industry to: increase resource and materials efficiency, install pollution abatement technologies, replace

chlorofluorocarbons (CFCs) and other ozone-depleting substances with appropriate substitutes, and reduce wastes and by-products.

Certain land-use and resource practices can decrease greenhouse gas sinks and increase atmospheric emissions. The loss of biological diversity may reduce the resilience of ecosystems to withstand climatic variations and air pollution damage. Atmospheric changes can affect forests, biodiversity, freshwater and marine ecosystems, and economic activities such as agriculture.

Agenda 21 proposes that appropriate national administrative, social and economic measures be taken to encourage sustainable land use and resource practices. Such practices should: reduce pollution and limit greenhouse gas emissions; conserve natural resources; and be more resilient to atmospheric changes. Sinks and reservoirs of greenhouse gases, including biomass, forests and oceans, should be managed sustainably.

The estimated annual cost (1993-2000) of activities in energy, transport, industry and land use is \$20 billion in international grants or concessional financing.

Recent data confirms that the Earth's stratospheric ozone layer is being depleted by reactive chlorine and bromine from human-made CFCs, halons and related substances. Atmospheric levels of these substances continue to rise.

Countries should ratify the Montreal Protocol and its amendments, and comply with its control and funding measures. They should replace CFCs and other ozone-depleting substances with holistically suitable substitutes. The estimated annual (1993-2000) cost of activities in this area is in the range of \$160-590 million on grant or concessional terms.

Transboundary air pollution harms human health, and causes tree and forest loss and the acidification of bodies of water. There is a lack of data on pollution and its environmental and health effects outside Europe and North America. Developing countries' capabilities to measure and assess pollution need to be strengthened.

Regional agreements for pollution control should be established and/or strengthened. Early-warning systems and response mechanisms are needed for pollution from industrial accidents, natural disasters and the deliberate or accidental destruction of natural resources. Costs for technical assistance and pilot programmes in this area are included in estimates for the first two programme areas in this chapter.

AN INTEGRATED APPROACH TO LAND-RESOURCE USE

(Section II, Chapter 10 of Agenda 21)

Increasing human demand for land, a finite resource, and for the natural resources it supports is creating competition and conflict that results in land degradation. Resolving such conflict requires an integrated approach to land use that examines all needs so that the most efficient trade-offs can be made.

Agenda 21 proposals for sustainable land-resource management and use focus on decision-making. Integration means that environmental, social and economic issues should be considered simultaneously. Also to be taken into account are the economic role of women in agriculture and rural development, the rights of indigenous peoples, local communities and the question of protected areas and private property rights.

Governments should use legislation, regulations and economic incentives to encourage sustainable use and management of land resources, paying particular attention to agricultural land. Pilot projects should experiment with new methods of land management.

Research is needed to assess the impact, risks, costs and benefits associated with various land uses. These values should be included in national accounts.

Improved scientific understanding of land resources should be supported, with priority given to determining land capacity, ecosystem functions and the interactions among land uses and environmental systems.

To promote a high degree of popular participation in decision-making, environmental awareness campaigns should be launched. Regional cooperation and information-sharing should also be strengthened.

An estimated \$50 million per year from international sources on grant or concessional terms will be needed during 1993-2000 for the programme proposed in this chapter.

Operational aspects of land planning and management are dealt with in other chapters of Agenda 21.

COMBATING DEFORESTATION

(Section II, Chapter 11 of Agenda 21)

Forest resources are essential to both development and the preservation of the global environment. Using them rationally can create employment, help alleviate poverty and provide a valuable range of products.

Mismanagement of forests from inadequate fire control, unsustainable commercial logging, overgrazing and the harmful effects of airborne pollutants is linked to degradation of soil and water sources, loss of wildlife and biological diversity and aggravation of global warming.

To support and develop the multiple ecological, economic, social and cultural roles and functions of trees, forests and forest lands, Agenda 21 calls on countries to strengthen their forest-related institutions and improve their technical and professional skills through measures such as:

- ▶ Promoting the participation of labour unions, rural cooperatives, local communities, indigenous peoples, youth, women, the private sector, users groups and non-governmental organizations in forest-related activities.

- Conducting research on forests, including gathering data on forest cover, areas suitable for afforestation and ecological values.
- Supporting and enhancing technology transfer and specialized training.

Urgent action is needed to conserve existing forests and to expand areas under forest and tree cover. Governments should create National Forestry Action Programmes for sustainable development of forests, support the implementation of the non-legally binding statement on forest principles adopted at the Earth Summit, and consider the need for appropriate arrangements to promote international cooperation on forest management, conservation and sustainable development of all types of forests.

Other proposals include:

- Creating and expanding Protected Area Systems.
- Promoting sustainable management of areas adjacent to forest.
- Carrying out revegetation and reafforestation in mountain areas, high lands, bare lands, degraded farm lands, arid and semi-arid lands and coastal areas.
- Developing planted forests to offset pressure on primary/old-growth forests.
- Protecting forests from pollutants, mining and shifting cultivation.
- "Greening" urban areas.
- Acknowledging the role of forests as national carbon reservoirs and sinks.
- Consolidating information on genetic resources and related biotechnology. Increasing action related to genetic improvement and application of biotechnology for improving productivity and tolerance to environmental stress through tree breeding, seed technology and germplasm banks.
- Surveying local/indigenous knowledge of trees and forests and their uses.

Environmentally sound technology, including biotechnology, is needed for all of these activities.

The survival of the forests and their continued contribution to human welfare depends on recognizing the social, economic and ecological values of trees, forests and forest lands, including the consequences of damage caused by their destruction. These values should be incorporated into national economic accounting systems.

Proposals for using forests in a way that reflects these values include:

- Promoting and popularizing non-wood forest products such as medicinal plants, dyes, fibres, gums, resins, fodder, cultural products, rattan and bamboo.
- Promoting small-scale forest-based enterprises that support rural development and local entrepreneurship.
- Promoting eco-tourism and wildlife management to generate rural income and employment without harmful ecological impacts.
- Using regulations and economic incentives to create a favourable climate for investment and management.
- Promoting more efficient forest harvesting for fuelwood and energy supply.

Supply and demand for forest products and services should be studied. Scientific investigations on non-timber forest products are needed.

A broad capacity-building effort is urgently needed so that countries can monitor forests (an essential requirement if programmes in Agenda 21 are to be implemented). Governments and institutions should establish and/or strengthen national assessment and observation systems for forests, forest resources and forest programmes. This will require new data systems and statistical modelling, remote sensing, ground surveys and other technological innovations.

Annual costs for combating deforestation from 1993 to 2000 are estimated at about \$32 billion, including \$3.2 billion in international grants or concessional funding.

HALTING THE SPREAD OF DESERTS

(Section II, Chapter 12 of Agenda 21)

Desertification affects the lives of about one sixth of the world's population, 70 per cent of all drylands — amounting to 3.6 billion hectares — and one quarter of the total land area of the planet. The results include poverty, decline in soil fertility and degradation of rangeland, rainfed croplands and irrigated land.

Agenda 21 states that the priority in combating desertification should be preventive measures for lands that are not yet degraded or which are only slightly degraded. However, severely degraded areas should not be neglected.

For regions prone to desertification and drought, better information and monitoring systems are needed to identify priority areas for action. Governments should establish and/or strengthen national systems, which should also measure the economic and social consequences of desertification. Regional programmes such as the Permanent Inter-State Committee on Drought Control in the Sahel (CILSS) and international organizations such as the Sahara and Sahel Observatory should be supported.

To combat desertification, Governments should:

- ▶ Adopt sustainable land-use policies and sustainable management of water resources.
- ▶ Use environmentally sound agricultural and pastoral technologies.
- ▶ Carry out accelerated afforestation and reafforestation programmes using drought-resistant, fast-growing species.
- ▶ Integrate indigenous knowledge related to forests, forest lands, rangeland and natural vegetation into research activities.

Proposals call for the eradication of poverty and promotion of alternative livelihoods in arid and semi-arid areas where traditional livelihoods based on agro-pastoral systems are often inadequate and unsustainable because of drought and demographic pressure. Governments should adopt a decentralized approach to land-resource management and create or strengthen rural organizations and rural banking systems.

Because land-use and development are intertwined, action plans to combat desertification and drought need to be integrated into national environmental planning and development plans. Governments need

to strengthen institutional capacity to develop and implement such plans; this will require increased regional and international cooperation and support.

An intergovernmental committee established by the United Nations General Assembly should draft an international convention to combat desertification, particularly in Africa.

Drought in sub-Saharan Africa led to the deaths of an estimated 3 million people in the mid-1980s and cost dearly in terms of lost production and diversion of development resources. Drought preparedness and drought-relief measures should include early-warning systems, contingency crop-planting linked to weather forecasts and strategies for importing, storing and transporting food during emergencies. Programmes for coping with refugees created by drought should be designed.

Popular support is needed for activities related to desertification and drought control. Proposals call for environmental education, technological training and support for local communities, particularly women and indigenous groups.

In addition to the costs of programmes to combat poverty and promote sustainable agriculture which are estimated in other chapters, the total annual cost (1993-2000) of proposals to reduce desertification and prepare for drought is estimated to be about \$8.7 billion, including nearly \$4.9 billion in international grants or concessional funding.

PROTECTING MOUNTAIN ECOSYSTEMS

(Section II, Chapter 13 of Agenda 21)

Mountains are an important source of water, energy, minerals, forest products, agricultural products and recreation. They are storehouses of biological diversity and endangered species and an essential part of the global ecosystem.

Mountain ecosystems are highly vulnerable and are increasingly susceptible to soil erosion, landslides and rapid loss of habitat and genetic diversity. Widespread poverty and expanding populations among mountain inhabitants result in deforestation, cultivation of marginal lands, excessive livestock grazing, loss of biomass cover and other forms of environmental degradation.

About 10 per cent of the world's people depend on mountain resources. Nearly half are affected by the degradation of mountain watershed areas.

Agenda 21 proposals focus on improving knowledge about ecology and sustainable development of mountain ecosystems, and on promoting watershed development and alternative employment for people whose livelihoods are linked to practices that degrade mountains.

Not enough is known about mountain ecosystems. The creation of a global mountain database is vital for launching programmes that would contribute to sustainable development of mountain ecosystems.

Countries should create incentives for local people to engage in conservation practices; diversify mountain economies; establish natural reserves in species-rich areas; and identify areas most vulnerable to erosion, floods, landslides, earthquakes, avalanches and other natural hazards, and to air pollution from industrial and urban areas.

Promoting integrated watershed development programmes through the participation of local people is a key to preventing further ecological damage. Proposals seek to ensure the appropriate use of land by the year 2000 to prevent soil erosion, increase biomass and maintain the ecological balance.

Sustainable tourism, fisheries, environmentally sound mining, beekeeping, the cultivation and processing of medicinal and aromatic plants and other alternative activities at the village level should be encouraged to protect the livelihoods of local communities and indigenous peoples.

Planning for mountain disasters and floods should include hazard-prevention measures, risk zoning, early-warning systems, evacuation plans and emergency supplies.

The estimated annual cost (1993-2000) of proposals in this area is \$13 billion, including \$1.9 billion from international sources on grant or concessional terms.

MEETING AGRICULTURAL NEEDS WITHOUT DESTROYING THE LAND

(Section II, Chapter 14 of Agenda 21)

The global population is expected to reach 8.5 billion by the year 2025, with 83 per cent living in developing countries. The demand for food is expected to increase by 50 per cent by the year 2000. The ability of agriculturalists to meet this challenge remains uncertain. Agenda 21 focuses on sustainable agriculture and rural development (SARD) to increase food production and conserve and rehabilitate land. Programme areas include:

► **Integrating sustainable development into agricultural policy and planning** — The absence of a coherent national policy framework for SARD is widespread and is not limited to developing countries. Agricultural policies need to be reviewed in relation to economic factors such as foreign trade, subsidies and taxes. Open trade and the removal of trade barriers should be encouraged. Demographic trends and population movements need to be taken into account. Laws, regulations and incentives that lead to food security and the transfer of appropriate farm technologies (such as food storage and distribution) need to be formulated.

► **Ensuring people's participation** — Women's groups, youth, indigenous people, local communities and small farmers need access to land, water and forest resources and to technologies, financing and services such as marketing, processing and distribution. Investment in land should be promoted by assigning clear titles, rights and responsibilities; strengthening rural institutions; providing technical training; and incorporating indigenous knowledge into the development of farm technology.

► **Improving farm productivity and diversifying rural employment** — Crop rotation, organic manuring and other techniques involving reduced use of agricultural chemicals should be developed.

Proposed improvements in infrastructure include financial networks, small-scale agro-processing units and rural service centres. To keep poor rural populations from using marginal lands, off-farm employment opportunities such as cottage industries, wildlife utilization, fisheries, light village-based manufacturing and tourism should be developed.

► **Harmonizing land resources planning** — Inappropriate land uses are a major cause of land degradation and depletion of land resources. Techniques for increasing production and conserving soil and water resources are available but not widely or systematically applied. Proposals call for involving farmers in the planning process, collecting and disseminating land resource data and establishing agricultural planning bodies at the national and local levels.

► **Conserving and rehabilitating land** — Soil erosion, salinization, waterlogging and loss of soil fertility are increasing in all countries. It is proposed that by the year 2000 national land resource surveys be conducted detailing the extent and severity of land degradation.

► **Conserving and sustainably using plant genetic resources** — Plant genetic resources for agriculture (PGRFA) are an essential resource for meeting future food needs. Threats are growing, efforts to promote genetic diversity are underfunded and understaffed, and in some cases the loss of diversity in gene banks is as great as it is in the field. *In situ* conservation areas and *ex situ* collection and germ plasma banks are needed. Better methods for researching and evaluating PGRFA should be encouraged. The benefits of research and development in plant breeding and seed production should be shared.

► **Conserving and sustainably using animal genetic resources** — There is a need for more and better animal products and for draught animals. The existing diversity of animal breeds should be catalogued, breeds at risk should be identified and preservation programmes should be put in place, including the use of cryogenic storage of germplasm.

► **Using integrated pest management and control** — Overuse of chemicals to control pests has had adverse effects on human health, the environment and on farm budgets. Integrated pest management — combining biological control, host plant resistance and appropriate farming practices -- is the best option for the future. It should be accompanied by appropriate pesticide management, including proper labelling, research and development of pesticides that are target specific and that break down into harmless constituent parts after use.

► **Employing sustainable plant nutrition** — Plants which deplete the soil of nutrients cause the loss of soil fertility. To maintain soil productivity, proposals call for the widespread availability of fertilizers and other plant nutrient sources and for improving soil fertility management.

► **Making the energy transition in rural areas** — In rural areas of developing countries, the chief sources of energy are firewood, crop residues, manure and animal and human energy. To increase productivity and generate income, rural energy policies and technologies should promote a mix of cost-effective fossil and renewable energy sources.

► **Evaluating the effects of ozone layer depletion** — Depletion of Earth's protective stratospheric ozone layer allows dangerous ultraviolet radiation from the Sun to reach the planet's surface. The potentially adverse effect on plants and animals should be assessed.

Annual cost estimates (1993-2000) for agricultural proposals in Agenda 21 (not including farm-related water programmes, which are considered separately) are \$31.8 billion, including \$5.1 billion from international sources on grant or concessional terms. By programme area the cost estimates are:

- ▶ Agricultural policy: \$3 billion, including \$450 million from international sources.
- ▶ People's participation: \$4.4 billion, including \$650 million from the international community.
- ▶ Farm productivity: \$10 billion, including \$1.5 billion in international financing.
- ▶ Land resources planning: \$1.7 billion, including \$250 million from international sources.
- ▶ Land conservation: \$5 billion, including \$800 million from the international community.
- ▶ Plant genetic resources: \$600 million, including \$300 million in international financing.
- ▶ Animal genetic resources: \$200 million, including \$100 million from external sources.
- ▶ Integrated pest management: \$1.9 billion, including external funding of \$285 million.
- ▶ Sustainable plant nutrition: \$3.2 billion, including \$475 million from international sources.
- ▶ Energy transition: \$1.8 billion, including \$230 million in external financing.

SUSTAINING BIOLOGICAL DIVERSITY

(Section II, Chapter 15 of Agenda 21)

The objectives and activities in this chapter of Agenda 21 are also aimed at supporting the Convention on Biological Diversity.

The essential goods and services on the planet depend on the variety and variability of genes, species, populations and ecosystems. Biological resources provide food, clothing, housing, medicines and spiritual nourishment. Recent advances in biotechnology, based on the genetic material of plants, animals and micro-organisms, show great potential for agriculture and medicine.

Despite mounting efforts over the past 20 years, the loss of the world's biological diversity, mainly from habitat destruction, over-harvesting, pollution and the inappropriate introduction of foreign plants and animals, has continued. This now represents a serious threat to human development.

Proposals in Agenda 21 for conserving biodiversity call on Governments to: press for the early entry into force of the UN Convention on Biological Diversity; foster traditional methods and knowledge of indigenous people and their communities; share the benefits of biological resources, including biotechnology, in particular with developing countries; and develop national strategies for the conservation of biodiversity, the sustainable use of biological resources and the safe transfer of biotechnology, particularly to developing countries.

National surveys should be undertaken in order to compile an inventory of biological resources, improve scientific and economic understanding of the importance and functions of biodiversity and suggest priorities for action. The economic and social implications and benefits of protecting biodiversity should also be assessed. A global network should regularly monitor, update and report this information.

Environmental impact assessments should be made for development projects likely to affect biological diversity. Economic incentives should be used to encourage the conservation of biodiversity and sustainable use of biological resources.

Conservation of biological diversity should occur through *in situ* conservation of ecosystems and natural habitats and *ex situ* measures, preferably in the country where the species are found. The rehabilitation of damaged ecosystems and endangered species should be promoted. Sustainable practices in areas adjacent to protected areas should be encouraged.

Technical and scientific cooperation should be promoted, with special attention given to technology transfer, professional training programmes and developing research and management facilities such as herbaria, museums, gene banks and laboratories.

The estimated annual cost of conserving biological diversity during the period 1993-2000 is \$3.5 billion. Half of this would have to come from international sources on grant or concessional terms.

ENVIRONMENTALLY SOUND MANAGEMENT OF BIOTECHNOLOGY

(Section II, Chapter 16 of Agenda 21)

Developments in the emerging field of biotechnology promise to make significant contributions to world development: better health care; enhanced food security through sustainable agricultural practices; improved supplies of drinking water; more efficient industrial processes for transforming raw materials; support for sustainable methods of afforestation and reafforestation; and detoxification of hazardous wastes. Proposals in Agenda 21 focus on:

- **Food** — Biotechnology can increase the nutritional value of crops, livestock and fish and the shelf-life of food and animal feed products. It can also improve agricultural output through integrated pest, disease and crop management techniques that eliminate dependence on agrochemicals.

- **Health** — Biotechnology can help combat communicable diseases through new and improved vaccines, drugs, medicines and diagnostics and can detect pollutants and pathogens in drinking water.

- **Environmental protection** — Biotechnology can help to: rehabilitate degraded ecosystems and landscapes through reafforestation and afforestation, cultivation of new plant varieties and soil conservation; reduce the risks of hazardous wastes through biological treatments; decrease waste volume through the use of biodegradable materials; and remove pollutants from the environment, such as accidental oil spills. Sound management of biotechnology also preserves biological diversity.

Most of the investment in modern biotechnology has been in the industrialized world. Biotechnology offers new opportunities for global partnerships between these countries — rich in technological expertise — and developing countries which are rich in biological resources.

Technology transfer, professional training, information-gathering, scientific exchanges, research and development, venture capitalization and other capacity-building measures should be promoted and accelerated.

Internationally agreed principles on safe management of biotechnology and on risk assessment need to be further developed. The preparation of international guidelines should be considered.

The traditional methods and knowledge of indigenous people and their communities should be protected, and indigenous peoples should share in the economic and commercial benefits arising from biotechnology.

Annual costs for managing and enhancing biotechnology from 1993 to 2000 are estimated at \$20 billion, with \$197 million coming from international funding sources on grant or concessional terms.

SAFEGUARDING THE OCEAN'S RESOURCES

(Section II, Chapter 17 of Agenda 21)

More than 70 per cent of the Earth's surface is covered by water. The activities of humans on land are a major threat to sustaining the biological richness of oceans and coastal areas.

Proposals in Agenda 21 focus on threats posed by sedimentation, pollution, harmful fishing practices and climate change.

Many programme areas share common problems: lack of data, lack of planning and management, lack of international coordination and technology transfer, and inadequate funds.

Coastal areas. Some 60 per cent of the world's people live within 60 kilometres of the shoreline.

Fishing, commerce, shipping and tourism often create problems that threaten sustainable development: chemical and bacterial pollution; sediment from cleared lands; destruction of habitats; runoff of nutrients that overstimulates aquatic plant growth; and poor, crowded and unsanitary human settlements.

Exclusive Economic Zones can create areas where states manage the development and conservation of natural resources.

Efforts must be made to create inventories and to plan and manage coastal resources, including habitats, infrastructure, human development, education, biodiversity and economic activities. Regional cooperation is needed to integrate plans.

An estimated \$6 billion a year will be needed between 1993 and 2000 to implement coastal management programmes, including \$50 million in international grants or concessional financing.

The marine environment is degraded by sewage, agricultural chemicals, synthetic organic compounds, litter, plastics, radioactive substances and hydrocarbons. Land-based activities contribute 70 per cent of the pollution, which enters the oceans through the atmosphere and rivers. Much waste is toxic and enters the food chain. Ships and dumping at sea contribute about 10 per cent of ocean pollution.

Agenda 21 proposals focus on preventing problems. Improving coastal management will reduce ocean pollution. The Montreal Guidelines for the Protection of the Marine Environment from Land-Based Sources and other regional agreements should be strengthened.

Controlling pollution from shipping will require improved monitoring and compliance with shipping protocols and agreements. Stricter international regulations to reduce the risk of accidents are also needed. Ocean spill response centres and a global database on marine pollution should be set up. Port facilities are needed to collect rubbish, oil and chemical residues from ships.

An estimated \$200 million per year in international grants or concessional financing will be needed to protect the marine environment during 1993-2000.

Living marine resources in the high seas. Problems are caused by unregulated fishing, overcapitalization, excessive fleet size, vessel reflagging (to escape control), gear that does not catch selectively, unreliable databases and a lack of cooperation between nations. As soon as possible, an intergovernmental conference should address problems relating to the conservation of fish stocks that are migratory or straddle national and international waters.

Marine species should be restored and maintained at sustainable levels. Selective fishing gear should be used to minimize waste. Effective monitoring and enforcement of existing agreements, such as the UN Convention on the Law of the Sea and improved monitoring (and compliance) by nations of ships flying their flag is needed. Dynamiting and poisoning should be prohibited. Large-scale drift-net fishing should be controlled.

An estimated \$12 million per year in international grants or concessional funding from 1993 to 2000 will be required for this programme.

Marine resources under national jurisdiction provide 95 per cent of the 80 to 90 million tons of fish and shellfish caught each year. They are an important source of protein for many countries. Over the last 40 years, the annual tonnage of yield has increased fivefold.

National fisheries now face overfishing, incursions by foreign fleets, ecosystem degradation, excessive fleet sizes, overcapitalization, gear that is not selective and competition between large-scale and local fishing. Coral reefs and coastal habitats like mangroves and estuaries are highly productive but are now threatened by a variety of sources.

Exclusive Economic Zones are one means of protecting and sustaining marine resources in order to meet long-term social, economic and development goals. Indigenous people must be represented in the planning process.

Also proposed is the restoration of depleted species, promotion of the use of selective fishing gear and preservation of ecosystems. Improved inventory is needed together with the management and development of coastal marine resources, particularly through small-scale projects. Waste from fishing must be reduced and the quality and better use of under-utilized species should be improved.

Programmes to restructure coastal fisheries would cost an estimated \$6 billion per year from 1993 to 2000, including \$60 million from the international community on grant or concessional terms.

The marine environment is vulnerable to climate and atmospheric change, including ozone depletion. The impact of rising sea levels and increased ultraviolet radiation will require extensive data collection.

Agenda 21 proposes that measurement, collection and data management techniques be standardized to permit a global exchange of research and information on climate and how climate change will impact coastal and marine resources. An estimated \$750 million, including \$480 million from international sources on grant or concessional terms, will be needed annually during 1993-2000 for this purpose.

Regional and international cooperation is essential in order to implement programmes on oceans and marine resources. An increased effort should be made within the UN and at many other levels. It is estimated that support of international cooperation at all levels will cost \$50 million in grants or concessional financing a year from 1993 to 2000.

Small islands. Sustainable development in small islands is complicated by small size, limited resources, geographic dispersion, isolation and ecological fragility. Global warming and a rise in sea level will render small islands more vulnerable to storms and could cause the loss of some or all territory.

Developed countries should help small islands make an inventory of their assets and plan for sustainable development of cultural, biological and economic resources. The consequences of possible climate change and sea-level rise must be taken into account.

Centres for developing and communicating scientific information and advice on appropriate technologies for small islands should be established.

The programme of technical exchange and planning would cost an estimated \$130 million per year from 1993 to 2000, including \$50 million in international grants or concessional financing.

PROTECTING AND MANAGING FRESHWATER RESOURCES

(Section II, Chapter 18 of Agenda 21)

Freshwater resources are an indispensable part of all terrestrial ecosystems. Floods and droughts, part of the hydrological cycle, have become more extreme in some regions. Global climate change and atmospheric pollution could affect the availability of fresh water and threaten ecosystems, particularly in low-lying coastal areas and small islands.

Adequate supplies of good quality water must be maintained for the entire world population, while preserving ecosystems. Human activities must adapt to the limits of nature's capacity to absorb their impact. Water-related diseases, which cause a third of all deaths in developing countries, must be fought. Innovative technologies are needed to fully utilize water resources and protect them against pollution.

Integrated planning and management of all types of water resources are needed to address the widespread scarcity and gradual destruction of these resources in many regions. Rational development plans must encompass multiple uses, including: water supply and sanitation, agriculture, industry, urban development, hydropower generation, inland fisheries, transport and recreation, while conserving water and minimizing wastage. Control of floods and sedimentation should be a priority.

By the year 2000, all states should, if capable, initiate national water management programmes, including costs, targets, institutions and laws.

Freshwater resources should be assessed and protected and national goals set for freshwater use, quality, protection and improvement. Research, data storage, modeling and wide dissemination of information connected to freshwater issues is also needed. The relationship between freshwater supplies and the impact of development must be clearly modeled to permit adequate planning.

Standards for discharges should be set, facilities built to treat sewage and the principle of "the polluter pays" invoked.

There needs to be more and better facilities to treat industrial waste and sewage. Mandatory environmental impact assessments on major development projects affecting water supplies should be carried out; pesticides and nitrate fertilizers should be used rationally; purified waste water should be used in agriculture, industry, aquaculture and other sectors; and there should be increased development and use of biotechnology.

Aquifers should be protected from toxics and from overpumping that leads to saltwater intrusion. Improved landfill design and management is required. Agricultural lands, aquatic habitats and ecosystems should be rehabilitated and wetlands protected. Programmes for monitoring water quality should be expanded.

Changes will be needed in national and international laws, in the training of personnel to manage water issues and in funding. Developing low-cost services that can be sustained at the community level will be crucial.

Agenda 21 calls for improving education about hygiene and greatly reducing illnesses associated with water, beginning with the eradication of guinea worm disease and river blindness by 2000.

Urban freshwater supply. By the year 2005, some 60 per cent of the world's people (some 5 billion people) will live in cities.

Agenda 21 calls for a supply of 40 litres of safe water per person per day; the establishment of discharge standards for municipal and industrial effluent; and the environmentally sound collection, recycling, or disposal of 75 per cent of the solid waste from urban areas.

In rural areas, a balance must be struck between using water for sustainable food production and for other purposes. Water-saving technology and management skills must be developed to provide for all demands -- from livestock and fisheries to human consumption. New irrigation schemes must be integrated into this balance.

Global climate change could have a great impact on fresh water supplies. Entire growing zones could change; intrusions of salt water could have a major impact on aquifers and low coastal areas. Research on impact is needed; contingency planning is called for.

The total cost of these programmes is estimated at \$54.7 billion, including about \$17 billion from international sources on grant or concessional terms.

SAFE USE OF TOXIC CHEMICALS

(Section II, Chapter 19 of Agenda 21)

Thousand of chemicals are used in every aspect of human endeavour but the long-term health and environmental risks of most of them are unknown. Ninety-five per cent of chemical manufacturing involves only 1,500 chemicals but crucial data for risk assessment are lacking for many of them. Chemicals banned in one country as hazardous are routinely sold and shipped to other countries, often to developing nations.

Some industrial areas have been grossly contaminated by chemicals, resulting in damage to human health, genetic structures and human reproduction. Lack of information and information-sharing mechanisms may have a serious impact on human health, the environment and on future generations.

Proposals in Agenda 21 include the following:

Improved risk assessment is essential. Communities and individuals have the right to know when they are dealing with toxic chemicals. Approximately 100,000 chemical substances are used in commerce but only a small percentage have been assessed, including commonly used pesticides.

Some 500 chemicals should be assessed by the year 2000 and the information shared internationally. Research leading to improved methods for assessing risk should be undertaken.

International labelling standards exist but are not yet available in the workplace or the home in all parts of the world. A multilingual system involving pictograms is recommended. Labelling should not be used to restrain international trade.

Prior Informed Consent (PIC) procedures identified in previous agreements on chemicals should be used. Negotiations now underway may ban producing countries from exporting chemicals that are banned in their domestic market. Governments and industry should improve and create additional national centres for information exchange on hazardous chemicals and their risks.

Risks can be reduced by using less hazardous chemicals or non-chemical technologies such as substituting biological pest controls for pesticides.

Risk reduction programmes should consider the entire life cycle of chemicals. Action should be taken in specific areas such as emission inventories, labelling, safe handling and exposure regulations and phasing out chemicals that are especially toxic or persistent in the environment.

Governments should consider adopting policies based on the principle of producer liability. Chemical accident response centres and national poison control centres should be established to ensure prompt diagnosis and treatment of poisonings.

Many countries lack national systems to cope with chemical risks, track usage of hazardous chemicals and collect evidence of misuse. National capabilities for managing chemicals need to be strengthened.

No global international agreement on traffic in toxic and dangerous products exists. Improved monitoring, detection and prevention measures are required as well as regional and international cooperation.

Some \$600 million would be needed annually during 1993-2000 to strengthen national capacities to manage toxic chemicals, including \$150 million in international grants or concessional financing. An additional \$47 million from international sources would be needed yearly for risk assessment and reduction and to harmonize labelling practices and exchange information.

MANAGING HAZARDOUS WASTES

(Section II, Chapter 20 of Agenda 21)

The uncontrolled production and disposal of hazardous wastes often creates problems years later with a high environmental cost to air, water, land, health and human productivity.

All countries produce and dispose of hazardous wastes on an increasingly large scale. Many -- especially developing countries -- are unaware of the hazards. Too often hazardous wastes have been shipped to nations that are unfamiliar with the dangers. Industrialized countries spend billions of dollars to clean up hazardous sites and evacuate residents from areas that have become health hazards.

Hazardous waste reduction should include setting goals for using cleaner manufacturing technology, recycling, substituting for hazardous materials and improving the transfer of clean technology. Governments are urged to provide domestic handling and recycling facilities for their own hazardous wastes.

International cost/benefit guidelines for hazardous waste production and management should be devised and the exchange of information through waste management centres at the national level should be improved.

Technology improvements leading to the reduction of hazardous wastes will require additional funding for research, demonstration projects and training. Legislation that supports source reduction through the "polluter pays" principle is required. Procedures for handling, storage, disposal and destruction of hazardous wastes over their entire life cycle should be improved.

To prevent innocent people from becoming victims of hazardous waste, many countries will need assistance in order to strengthen trained staffs and organizations that can deal with hazardous waste risk assessment, monitoring and management. Legislation and public information programmes are required. Hazardous sites must be cleaned up.

International cooperation is required to disseminate information on risks, to control transboundary shipping and to spread information on new technologies that will reduce the amount of hazardous wastes produced or improve methods for handling and disposal. Cooperation is also required to design, develop and strengthen individual nations' hazardous waste programmes and centres.

Governments should ascertain that their military establishments conform to their nationally applicable environmental norms in their treatment and disposal of hazardous wastes.

Governments are encouraged to adopt regulations that treat wastes in a manner consistent with regulations in the country of origin. A ban on exporting wastes to nations that do not have the capacity to deal with them in an environmentally sound way is proposed. Cooperation on regional waste recycling, reuse and recovery programmes is proposed. Several existing international agreements and conventions on traffic in hazardous wastes should be strengthened.

Preventing illegal traffic in hazardous wastes will require legislation, monitoring and enforcement programmes to ensure that penalties are in place and enforced.

The estimated annual cost (1993-2000) of managing hazardous wastes is \$18.5 billion globally and \$3.5 billion in relation to developing countries, including \$500 million in international grants or concessional financing. An estimated \$750 million a year will be needed from international sources to promote waste prevention and minimization.

SEEKING SOLUTIONS TO SOLID WASTE PROBLEMS

(Section II, Chapter 21 of Agenda 21)

Growing mountains of solid waste, including septic tank and sewage sludge, are a serious threat to surface water, ground water, the soil and the air.

Health, the quality of life and the potential for development are affected by poor management of solid wastes. Oceans are affected when wastes are dumped at sea and air quality deteriorates where wastes are burned in open pits.

By the end of this century, 2 billion people will be without basic sanitation. Some 5.2 million — including 4 million children — die each year from waste-related diseases. Half of the urban population in developing countries has no service for solid waste disposal. Globally, the amount of municipal waste produced is expected to double by the end of the century and double again before the year 2025.

Agenda 21 proposals for solid waste management focus on four programme areas.

Minimizing waste. This will require countries to establish targets for waste reduction that will influence patterns of production and consumption. Industrialized nations should set goals that would hold *per capita* waste production at levels that prevail in the year 2000. They should consider investing in waste minimization 1 per cent of their expenditures on solid waste and sewage disposal (\$6.5 billion at current levels).

More research on clean technologies, new methods for sharing information internationally and incentives for reducing waste are needed. The ability to monitor and understand the solid waste production and disposal cycle must be improved.

Reuse and recycling become more economically attractive as disposal sites are filled or closed. Disposal costs are expected to double or triple by the end of the decade. National programmes for waste reuse and recycling should be in place by 2000 in industrialized countries and by 2010 in developing countries.

Recycling programmes must be expanded. Economic, market and legal incentives are needed to support reuse and recycling. Technologies for recycling plastic, rubber and paper should be priorities for transfer.

Home and community-based programmes, including separate collection of recyclable household wastes, must be set up. Environmentally sound waste disposal, particularly of sewage and sewage sludge, is necessary to protect human health as well as the environment.

An estimated \$850 million will be needed annually (1993-2000) on grant or concessional terms for reuse and recycling programmes in developing countries.

International standards for environmentally sound treatment and disposal of waste must be established. Alternatives to dumping sewage sludge at sea must be developed. The capacity to monitor waste disposal and exchange information through an international clearinghouse must be developed.

All countries must establish waste treatment and disposal criteria and develop the ability to monitor the environmental impact of wastes by the year 2000. By 1995, industrialized countries should ensure that at least half of all sewage, waste waters and solid wastes is disposed of according to national or international guidelines. Developing countries would work toward a 2005 deadline. By 2025, all countries would dispose of all wastes according to international quality guidelines.

Safe disposal programmes in developing countries will cost an estimated \$15 billion a year, including \$3.4 billion in international grants or concessional financing.

Extending waste services will require national planning, international cooperation and funding. United Nations programmes can provide a framework for this.

Billions of people lack basic sanitation services. Waste service coverage must be extended. These needs must be factored into development plans. By the year 2025, full waste services should be available in all urban areas and sanitation services should be extended to rural areas. The estimated annual cost will be \$7.5 billion, including \$2.6 billion in international grants or concessional financing.

MANAGEMENT OF RADIOACTIVE WASTES

(Section II, Chapter 22 of Agenda 21)

The growing volume of radioactive wastes poses serious environmental and health dangers. Reducing this will require national management that minimizes the production of nuclear wastes and provides for their safe processing, transportation and disposal.

International cooperation should be strengthened to ensure that nuclear wastes are handled, stored and disposed of in an environmentally sound manner.

The most dangerous radioactive waste is high-level waste (generated in the nuclear fuel cycle) and spent nuclear fuel. Nuclear power stations around the world produce some 10,000 cubic metres annually. This is about 99 per cent of all radionuclides that have to be disposed of. This amount is increasing as more nuclear power plants become operational and other nuclear facilities are decommissioned.

The use of radionuclides in medical, research and industrial applications currently results in about 200,000 cubic metres annually of low- and intermediate-level waste, and the volume is growing. The risk varies; it is generally less than high-level waste but sufficient to justify stringent protection measures.

Most countries with substantive nuclear power programmes have adopted technical and administrative measures for managing nuclear wastes. Such management systems are still needed in many other countries.

Proposals in Agenda 21 call for:

- ▶ Governments to promote policies and practical measures to limit the generation of radioactive wastes and provide for safety at every stage of their use.
- ▶ Support for the efforts of the International Atomic Energy Agency (IAEA) to develop safety standards and codes of practice for the safe and environmentally sound management and disposal of radioactive wastes.
- ▶ The transfer to developing countries of the technology needed for safe storage, transportation and disposal of nuclear wastes and/or the return to the supplier of radioactive sources after their use.
- ▶ States to strengthen efforts to implement the IAEA Code of Practice for International Transboundary Movement of Radioactive Waste and review the possibility of creating a legally binding instrument.
- ▶ Governments to encourage the London Dumping Convention to complete studies on banning the disposal of low-level radioactive wastes at sea, in place of the current voluntary moratorium.
- ▶ Governments to not allow the storage or disposal of radioactive waste near the marine environment unless they determine that scientific evidence shows that this poses no unacceptable risk to people or the environment.
- ▶ Countries to not export radioactive wastes to countries that prohibit such imports and to respect regional environmental conventions that deal with radioactive wastes, including the Bamako Convention and Lomé IV Convention.

National costs to manage and dispose of radioactive waste will vary according to the technology used. International organizations will need an estimated \$8 million a year.

States should assess the health and environmental impact of disposing of radioactive wastes and promote research into methods for their safe treatment, processing and disposal, including deep geological disposal.

Developing countries require assistance to enable them to safely handle wastes generated from nuclear applications.

ACTION FOR WOMEN: SUSTAINABLE AND EQUITABLE DEVELOPMENT

(Section III, Chapter 24 of Agenda 21. Note: Chapter 23 consists of a preamble to Section III which emphasizes the importance of the involvement of all social groups in achieving sustainable development.)

To guarantee the full and equal participation of women in all development activities and particularly environmental management, Agenda 21 proposes that Governments embrace a number of objectives related to women's advancement and education.

Agenda 21 proposes the following:

All countries should implement the Nairobi Forward-looking Strategies for Women which emphasize the need for women to participate in ecosystem management and control of environmental degradation.

Policies are needed to increase the proportion of women in programmes for sustainable development involving decision-making, planning, and technical and management roles. Women's bureaux and non-governmental organizations must be strengthened.

Consideration should be given to issuing, by the year 2000, a strategy for eliminating constitutional, legal, administrative, cultural, behavioural, social and economic obstacles to women's full participation in sustainable development and public life.

By 1995, there should be national, regional and international mechanisms to assess the impact of development and environment programmes on women and ensure that they participate and benefit.

Educational policies and curricula should disseminate gender-relevant knowledge and promote the enhanced value of women's roles.

Priority measures are needed to eliminate female illiteracy, assure girls' universal access to primary and secondary education, expand enrolment in schools, and provide increased post-secondary training opportunities for women in the sciences and technology.

To reduce the heavy workload of women and girls, Governments, local authorities and employers should establish affordable nurseries and kindergartens. National programmes are required to encourage men to share household tasks equally with women.

Environmentally sound technologies developed in consultation with women should be promoted and access provided to clean water, adequate sanitation facilities and efficient fuel supplies.

Health facilities — including safe and effective women-centred and -managed reproductive health care and family planning services — should be strengthened and made more accessible. Comprehensive health care should include prenatal care, and information on maternal and child health and responsible parenthood, and should provide mothers the opportunity to breast-feed their infants for at least the first four months of life.

Equal employment opportunities and equal pay for women should be supported by providing day-care facilities and parental leave. Women should have equal access to credit, land and other natural resources; rural banking systems could be established to increase women's access to credit.

Women have a crucial role to play in changing unsustainable patterns of consumption and production particularly in industrialized countries. Programmes are needed to develop consumer awareness and encourage investment in environmentally sound productive activities.

All Governments are urged to ratify all relevant conventions relating to the status of women and to transform women's rights into legal measures that ensure women's full and equal participation in development decisions. Parties to the UN Convention on the Elimination of All Forms of Discrimination Against Women should suggest amendments by the year 2000 that strengthen women's access to natural resources, technology, credit and low-cost housing, and the control of pollution in the home and workplace.

Countries should avert the rapid environmental and economic degradation in developing countries that generally affects women and children in rural areas. Major problems include drought, desertification, armed hostilities, natural disasters, toxic waste and unsuitable agro-chemical products.

Research and data collection should focus on: women's knowledge and experience in managing natural resources; the impact of structural adjustment programmes on women; the impact on women of environmental degradation; and integrating the value of "domestic" and other unpaid work by women into resource accounting.

Gender-impact analysis should be an essential component in programmes. Rural and urban training and resource centres are needed to disseminate environmentally sound technologies to women.

The capabilities of all United Nations institutions to involve women in development and environmental management should be strengthened. The Division for the Advancement of Women, the United Nations Development Fund for Women (UNIFEM), the International Research and Training Institute for the Advancement for Women (INSTRAW), and the women's programmes of the regional commissions require special attention. Where appropriate, United Nations organizations should increase the number of women in senior posts.

The estimated average annual cost (1993-2000) of activities to enhance women's participation in development and environmental management is \$40 million in international grants or concessional financing.

SOCIAL PARTNERS FOR SUSTAINABLE DEVELOPMENT

(Section III, Chapters 25-32 of Agenda 21)

Broad public participation in decision-making is fundamental for sustainable development. Individuals, groups and organizations need to take part in assessing the environmental impact of decisions that may affect their communities; they should have access to all relevant information.

Agenda 21 addresses the critical need to involve major social groups in policies and activities in all of its programme areas.

Youth (Chapter 25) make up 30 per cent of the world's population and need to participate in decisions that determine their future. Development plans should ensure that young people are provided with a healthy environment, improved living standards, education and employment opportunities.

By 2000, more than 50 per cent of each country's youth should have access to secondary education or equivalent vocational training. Education should incorporate environmental awareness and sustainable development concepts. Human rights abuses against the young, particularly females, should be fought.

Governments should implement programmes to reach the environment and development goals endorsed by the 1990 World Summit for Children, especially in regard to health, nutrition, education and the alleviation of poverty.

An estimated \$1.5 million will be needed annually (1993-2000) on grant or concessional terms for activities to involve youth in sustainable development; costs required to protect and educate children are included in estimates for other chapters of Agenda 21.

Indigenous people (Chapter 26) generally have an historical relationship with their lands and a holistic traditional scientific knowledge of natural resources and the environment. Their participation in national and international sustainable development decisions should be strengthened.

A process to empower indigenous communities should recognize their values, traditional knowledge and resource management practices, and their dependence on renewable resources and ecosystems. Their lands should be protected from environmentally unsound activities and from activities indigenous people consider to be socially and culturally inappropriate. Some communities may require greater control over their lands and self-management of their resources.

An estimated \$3 million on grant or concessional terms will be needed annually (1993-2000) to implement activities in regard to indigenous people.

Non-governmental organizations (Chapter 27) play a vital role in participatory democracy and possess diverse expertise in fields important to sustainable development. The United Nations system and Governments should strengthen mechanisms to involve non-governmental organizations in decision-making.

The full participation of local authorities (Chapter 28) in the programmes of Agenda 21 is crucial. They oversee planning, maintain infrastructure, establish environmental regulations, assist in implementing national policies and are pivotal in mobilizing the public around sustainable development.

By 1996, most local authorities in each country should have achieved consensus with citizens, local organizations and private enterprises on "a local Agenda 21."

International secretariat services will need an estimated \$1 million annually (1993-2000) to help implement activities in this regard.

Workers and trade unions (Chapter 29) have valuable experience in industrial change and an essential stake in protecting the working environment. To allow their full participation in sustainable development, Agenda 21 calls on Governments and employers to respect workers' rights to freedom of association and organization, and to promote the active participation of workers and unions in industrial strategies and policies.

Employers, workers and Governments should address safety, health and environmental issues. Workers should participate in environmental audits and impact assessments and have adequate training to protect the environment and their own safety and health.

Activities to strengthen the role of workers and trade unions will require an estimated \$300 million annually (1993-2000) in international grants or concessional financing.

Business and industry (Chapter 30) are crucial to economic development and can play a major role in reducing resource use and environmental damage. Governments, business and industry (including transnational corporations) should promote more efficient and cleaner production, including increased reuse and recycling of residues and reduction of the quantity of waste discharged.

A mix of economic incentives and legal measures should be used to promote these goals. Accounting and pricing mechanisms should incorporate environmental costs.

Entrepreneurs, particularly small and medium-sized ones, can play an important role in providing employment, improving resource-use efficiency and reducing environmental risks. To encourage responsible entrepreneurship, Governments should streamline administrative procedures and in cooperation with the private sector help establish venture capital funds for sustainable development projects.

Additional costs of such efforts, mostly involving reorientation of existing activities, are not expected to be significant.

The scientific and technological community (Chapter 31) should contribute to development policies more openly and effectively. This will mean improved communication and cooperation between the community — which includes engineers, architects, industrial designers, urban planners and other professionals — and decision-makers and the public.

Cooperative networks and programmes for disseminating the results of scientific research should be strengthened. About \$15 million per year (1993-2000) will be needed from international sources on grant or concessional terms for these and related activities.

Scientific and technological codes of practice and guidelines relating to sustainable development should be promoted to ensure that natural processes are properly valued. This will involve international cooperation, national advisory groups on environmental and developmental ethics and extended training in these issues. About \$5 million in international grants or concessional financing will be needed for this during 1993-2000.

Farmers (Chapter 32) — the stewards of much of the Earth's resources — are central to sustainable agriculture. Farm production has increased over the past 20 years but in some regions this has been outstripped by population growth, international debt or falling commodity prices. Much of the rural population in developing countries depends on subsistence agriculture, has limited access to resources and technology, and consequently engages in overexploitation of marginal lands.

To motivate farmers to manage natural resources sustainably, Governments should: decentralize decision-making by strengthening local and village organizations; promote financial incentives (through trade policies and pricing mechanisms); and support the formation of farmers' organizations. Women should be given access to land, credit, technology and training.

Governments and international organizations should: support research to develop farming technologies that enhance crop yields, maintain land quality, recycle nutrients, conserve water and energy, and control pests; compare high- and low-input agriculture; and make optimal use of human labour and animal power.

Financing required for these activities is estimated in Chapter 14 of Agenda 21.

FINANCIAL RESOURCES AND MECHANISMS

(Section IV, Chapter 33 of Agenda 21)

Economic growth, social development and poverty eradication are overriding priorities in developing countries, and are essential to sustainability. The provision to developing countries of financial and technical resources needed to implement Agenda 21 will benefit all humanity; the long-term cost of inaction could be much greater.

Global and local environmental issues are interrelated. Special efforts are required to deal with issues like climate change and biological diversity.

Free trade and access to markets will help make economic growth and environmental protection mutually supportive for all countries.

International cooperation for sustainable development should complement the efforts of developing countries. For this, substantial new and additional financial resources, including grants or concessional financing at predictable levels, will be required.

In order to provide this, developed countries reaffirm their commitment to reach as soon as possible the United Nations target of 0.7 per cent of gross national product (GNP) annually for official development assistance (ODA); some have agreed to reach the target by the year 2000. The Commission on Sustainable Development will monitor progress towards this target. There should be equitable burden-sharing among developed countries. Other countries may contribute voluntarily.

Use should be made of all available funding sources and mechanisms, including:

- The International Development Association (IDA),¹ and regional and subregional development banks.

- The Global Environment Facility, managed jointly by the World Bank, the UN Development Programme (UNDP) and the UN Environment Programme (UNEP). The facility should be restructured to encourage universal participation. Its scope should be extended to relevant Agenda 21 programme areas with global benefits. Decision-making and operations should be transparent and democratic; there should be balanced and equitable representation of developing countries' interests, as well as due weight given to donor countries' funding efforts. Funds should be disbursed under mutually agreed criteria without introducing new conditions on lending.

- Specialized agencies, United Nations bodies and multilateral institutions designated to support Governments in implementing Agenda 21. UNDP should be supported in facilitating capacity building and technical cooperation at the country level, and should make full use of the expertise of UNEP.

- Debt relief measures for low- and middle-income developing countries, including debt swaps.

- Increased private funding and direct investment, encouraged through national policies and joint ventures.

- Innovative financing: new ways of generating funds should be explored, including fiscal incentives, tradeable permits, and reallocation of resources presently committed to military purposes.

The estimated annual costs (1993-2000) of implementing the activities in Agenda 21 in developing countries are over \$600 billion, including \$125 billion in international grants or concessional financing. Countries in a position to do so should report initial financial commitments at the 47th session of the General Assembly. Funding and mechanisms should be reviewed regularly.

¹ The text of Agenda 21 directs IDA to give special consideration to the statement by World Bank President Lewis Preston at UNCED. In that statement Mr. Preston proposed that additional funds be made available to IDA — specifically that the amount given to replenish IDA funds for the 1993-1995 period (the IDA-10 replenishment) be at a level that would maintain IDA-9 funding in real terms. He also proposed that part of the World Bank's net income (\$1.2 billion annually) be allocated to the IDA as an "Earth Increment" that would fund national environmental projects.

MAKING ENVIRONMENTALLY SOUND TECHNOLOGY AVAILABLE TO ALL

(Section IV, Chapter 34 of Agenda 21)

To develop sustainably, all countries need access to and the capacity to use technology that preserves resources and protects the environment.

Environmentally sound technologies are less polluting, use all resources more sustainably, recycle more of their wastes and products and handle residual wastes better than the technologies for which they substitute. They include both processes for reducing waste products and "end of pipe" treatment of pollutants.

Transfer of technology includes the exchange of knowledge, goods, services and organizational procedures. Developing countries need support to build their economic, technical and managerial capabilities. This will require a long-term joint effort by enterprises and Governments supplying and receiving technology; together with the systematic training of craftspersons, technicians, managers, scientists, engineers and educators.

Developing countries, in particular, require new and efficient technologies in order to alleviate poverty and human suffering. Better access to information on technologies, including environmental risks, is required so that Governments can make informed choices about improving or replacing unacceptable production methods.

Much technological knowledge lies in the public domain. Proprietary technology is available through commercial channels, making international business an important vehicle for technology transfer. While ways to assure access by developing countries to state-of-the-art technologies continue to be explored, enhanced access should be facilitated and financed as appropriate, while providing fair incentives to innovators.

The role of patent protection and intellectual property rights in the transfer of environmentally sound technology should be further examined. Consideration should be given to assuring developing countries access to technologies covered by proprietary rights.

Technology should be transferred on concessional and preferential terms, as mutually agreed, taking into account the need to protect intellectual property rights as well as the special needs of developing countries.

International information networks and regional clearinghouses should be developed for agriculture, industry and energy. Networks could include national and regional patent offices equipped to report on technologies, their sources, environmental risks and the broad terms under which they may be acquired.

National policies (including subsidies, taxes and regulations) should encourage the private and public sectors to become innovative, to market and use environmentally sound technologies and to remove barriers to transfer.

Proposals include: purchase of patents and licenses on commercial terms for transfer to developing countries on non-commercial terms; prevention of abuse of intellectual property rights by establishing rules for their compulsory acquisition, with fair and adequate compensation and in compliance with international conventions; provision of financial resources to enable developing countries to implement sustainable development measures that entail a special burden to them; and development of access and transfer mechanisms, taking into account the decision by the UN Conference on Trade and Development (UNCTAD) to negotiate an international code of conduct on technology transfer.

Governments should support programmes of technological cooperation and assistance and the creation of a collaborative international network of research centres on environmentally sound technology. Visits or the voluntary return to their home countries by experts from developing countries who are working in developed nations should be facilitated.

The international community should help countries exchange experiences and develop the capacity to assess their technology needs, including environmental impact and risk assessment.

The estimated annual cost (1993-2000) of the activities of this chapter is between \$450 million and \$600 million in international grants or concessional financing.

SCIENCE FOR SUSTAINABLE DEVELOPMENT

(Section IV, Chapter 35 of Agenda 21)

Science is essential to the search for sustainable development and should be responsive to emerging needs. Better scientific understanding of the connections between human activities and the environment and better use of that knowledge must be incorporated into the formulation of policies for development and environmental management.

More research into climate change, resource consumption rates, demographic trends and environmental degradation is needed and methods for long-term assessment of natural resources should be improved. Research capacity, especially in developing countries, should be strengthened.

Strategies for sustainable development must be based on an accurate assessment of the Earth's carrying capacity and resilience to human activity. A deeper understanding of the interconnections between water, nutrient and biogenic cycles and the energy flows of land, oceans and atmosphere is crucial. The efficiency of resource utilization should be improved and preferable alternatives should be developed such as less intensive use of energy in industry, agriculture and transportation.

Strengthening the scientific basis for sustainable management — There must be a systematic assessment of the long-term local and regional effects of global change and the integration of results into the development process. Constant re-evaluation of resource use should be made in order to reduce the environmental impact; and better communication among scientists, decision makers and the general public should be established as part of policy-making.

Greater use should be made of quality-of-life indicators and data on links between ecosystems and human health, and of economic measures, including incentives. Long-term policies should be informed by assessments of risks and available technologies.

The estimated annual cost of activities in this programme area from 1993 to 2000 is \$150 million, including \$30 million in international grants or concessional financing.

Enhancing scientific understanding — Knowledge of the Earth's carrying capacity and processes that impair or enhance its ability to support life should be expanded. More research is needed on natural systems. New analytical and predictive tools should be developed and applied, and the physical, economic and social sciences should be better integrated.

There should be better and more expanded monitoring of water, chemical and biological cycles; research in atmospheric chemistry and sources and sinks of greenhouse gases; coordination of satellite surveys of air, water and land and their interactions; and the development of techniques for predicting and countering the effects of environmental stresses.

Also needed are: studies of the role biodiversity and species loss play in ecosystems; parameters for managing coastal and mountain zones; expansion of water-quality monitoring systems; measures to better predict and prepare for natural disasters; and more research into the impact of human activities on environment and the responses of humans to global environmental change.

Activities in this programme will cost an estimated \$2 billion a year (1993-2000), including \$1.5 billion in international grants or concessional financing.

Improving long-term scientific assessment — Research results should be used to guide development paths appropriate for each region. Data collection should be coordinated to allow long-term estimates of resource depletion, energy use, health impacts and demographic trends. Regular, standardized audits of carrying capacity and vulnerable resources are needed at the national, regional and global levels.

These activities will cost an estimated \$35 million per year from 1993 to 2000, including \$18 million from international sources on grant or concessional terms.

Building up scientific capacity and capability — Education and training in science and technology should be expanded, including environment-related sciences. More scientists are needed in all countries to identify environmental considerations and incorporate them into research and development projects.

Developing countries need assistance to study and manage their resource bases and to improve their research and development capacity. Schools, universities and research institutions need adequate equipment and access to current literature.

National scientific databases and regional and global information networks should be expanded. Financial incentives can stimulate research and development and their use in the productive sectors of the economy. Indigenous knowledge should be compiled, analyzed and published.

Scientists from developing countries must participate fully in international research programmes so that their Governments can participate equally in environment and development negotiations. To stem the

exodus of scientists from developing nations, adequate salaries, equipment, libraries and other facilities must be made available in their home countries.

The estimated cost of this programme is \$750 million per year from 1993 to 2000, of which \$470 million is needed from international sources on grant or concessional terms.

PROMOTING ENVIRONMENTAL AWARENESS

(Section IV, Chapter 36 of Agenda 21)

Education is critical for promoting sustainable development and effective public participation in decision-making. Proposals in Agenda 21 focus on reorienting education towards sustainable development, increasing public awareness and promoting training.

Countries, schools and/or the appropriate international and national institutions and organizations should:

- ▶ Strive to ensure universal access to basic education.
- ▶ Achieve primary education for at least 80 per cent of girls and 80 per cent of boys of primary school-age through formal schooling or non-formal education.
- ▶ Reduce adult illiteracy rates to at least half of their 1990 levels, with particular focus on women.
- ▶ Endorse the recommendations of the World Conference on Education for All: Meeting Basic Learning Needs, held in Thailand in March 1990.
- ▶ Achieve environmental and development education from primary school-age through adulthood.
- ▶ Integrate environment and development concepts, including demography, in all education programmes, with a particular emphasis on discussing environmental problems in a local context.
- ▶ Create a national board, representative of all environmental and developmental interests, to give advice on education.
- ▶ Involve schoolchildren in local and regional studies on environmental health, including safe drinking water, sanitation, food and ecosystems.
- ▶ Encourage cross-disciplinary university courses in fields which have an impact on the environment.
- ▶ Promote adult education programmes based on local problems related to environment and development.

There is still a considerable lack of awareness regarding the interrelated nature of human activities and the environment. A global education effort is proposed to strengthen attitudes, values and actions that are environmentally sound and that support sustainable development. The effort should also promote ecological tourism, making use of national parks and protected areas.

Training is one of the most important tools to facilitate the transition to a more sustainable world. It should have a job-specific focus, aimed at filling gaps in knowledge and skills that would help individuals find employment and be involved in environment and development work.

Scientific training requires the transfer of new environmentally sound technology and know-how. Environmental technicians should be locally recruited and trained to serve communities' needs.

Governments, industry, trade unions and consumers should promote an understanding of the interrelationship between good environment and good business practices.

The estimated annual cost of Agenda 21 programmes for education, promoting environmental awareness and training is between \$14.2 billion and \$15.2 billion annually from 1993 to 2000. Of this, \$5.6-\$6.6 billion would have to come from international sources on grant or concessional terms.

BUILDING NATIONAL CAPACITY FOR SUSTAINABLE DEVELOPMENT

(Section IV, Chapter 37 of Agenda 21)

Capacity-building means developing a country's human, scientific, technological, organizational, institutional and resource capabilities. Technical cooperation for capacity-building, including technology transfer and know-how, should be driven by the individual needs and specific conditions of the recipients.

Strategies, priorities and programmes should be based on broad internal consensus and should improve countries' ability to respond to new long-term challenges rather than concentrating only on immediate problems.

Each country should complete, if possible by 1994, a review of its capacity-building needs.

The international aid process as it relates to technology transfer, know-how and other technical cooperation for sustainable development should be reviewed and evaluated by the United Nations, donor and recipient countries, and public and private organizations. The United Nations system could strengthen its activities in technical cooperation and mobilize international funding in this area.

Existing international multilateral institutions with responsibilities for environment and/or development issues should be improved and reoriented to ensure that they have the ability to integrate environment and development.

Bilateral technical aid to developing countries would cost about \$15 billion annually, one fourth of total official development assistance. Implementing Agenda 21 would require more effective use of these funds, as well as additional funding in specific areas. The estimated annual cost (1993-2000) of the activities of this chapter will be \$300 million - \$1 billion in international grants or concessional financing.

STRENGTHENING INSTITUTIONS FOR SUSTAINABLE DEVELOPMENT

(Section IV, Chapter 38 of Agenda 21)

To accomplish the work agreed to at the Conference, existing institutions must be modified and strengthened and new institutions could be created. National capacity-building for environment and developing should be part of this effort.

Agenda 21 proposals address the role of institutions within the United Nations, post-Conference arrangements and the relationship between the UN system and other international, regional, national and non-governmental institutions, organizations and groups — including industry, business and scientific communities.

Institutional structures envisaged in Agenda 21 will be based on agreement on financial resources and mechanisms, technology transfer, the Rio Declaration on Environment and Development and substantive sections of Agenda 21.

It is proposed that the General Assembly, as the principal policy-making organ for Conference follow-up, could consider holding a special session no later than 1997 to review and appraise implementation of Agenda 21.

The Economic and Social Council (ECOSOC) would assist the General Assembly in Conference follow-up and implementation of Agenda 21 by overseeing system-wide coordination through a high-level Commission on Sustainable Development. The Commission, consisting of States elected as members with regard to equitable geographic distribution, should convene no later than 1993. The General Assembly, at its 47th session, should determine the Commission's relationship with other intergovernmental bodies concerned with the environment and development.

The Commission on Sustainable Development will provide for the involvement of United Nations organizations and international financial institutions in implementing Agenda 21 and in integrating environmental and developmental concerns. It will monitor progress in the implementation of goals and financial commitments, and make appropriate recommendations — through ECOSOC — to the General Assembly.

Implementing Agenda 21 will require close and effective cooperation and exchange of information between the United Nations system and the multilateral financial institutions. This task should be given to the Administrative Committee on Coordination, headed by the Secretary-General.

Intergovernmental bodies, the Secretary-General and the United Nations system may also benefit from the expertise of a high-level advisory board appointed by the Secretary-General, consisting of eminent persons knowledgeable about environment and development including relevant sciences.

To provide the technical and operational assistance and coordination necessary for Agenda 21's programmes, UNDP and UNEP should be strengthened. UNCTAD should also play an important role, and the United Nations Sudano-Sahelian Office should also be strengthened.

Regional and sub-regional cooperation will be an important part of the Conference outcome. States should consider the preparation of national action plans and/or coordinating bodies for the implementation of Agenda 21. Non-governmental organizations and major groups such as women are important partners and should be given opportunities to make their contributions.

INTERNATIONAL LEGAL INSTRUMENTS AND MECHANISMS

(Section IV, Chapter 39 of Agenda 21)

Agenda 21 proposals for international law on sustainable development focus on improving the legislative capabilities of developing countries, assessing the efficacy of current international agreements and setting priorities for the future.

International law on sustainable development needs to be further developed, giving special attention to the delicate balance between environmental and developmental concerns and to the special needs of developing countries.

The participation of all countries in global treaty-making is essential. Many existing international legal instruments and agreements in the field of environmental law have been developed without the adequate participation and contribution of developing countries.

Developing countries should be provided with technical and financial assistance to enhance their ability to participate in national and international negotiations and to implement and monitor national and international agreements relating to sustainable development.

International standards for environmental protection should be promoted gradually, taking into account the different situations and abilities of countries. Policies should address the root causes of environmental degradation, and should not unnecessarily restrict international trade. Measures to address international environmental problems should, as far as possible, be based on consensus; unilateral actions should be avoided. Any necessary trade measures should be non-discriminatory, give adequate notification of national regulations, and give consideration to the special requirements of developing countries.

States should consider broadening and strengthening international mechanisms for identification, avoidance and settlement of disputes in the field of sustainable development.

Measures should be considered to address, in times of war, large-scale destruction of the environment that cannot be justified under international law. The General Assembly and its Sixth Committee are the appropriate forums to deal with this subject, taking into account the role of the International Committee of the Red Cross.

To ensure safe and environmentally sound nuclear power, efforts should be made to conclude negotiations for a nuclear safety convention in the framework of the International Atomic Energy Agency.

BRIDGING THE DATA GAP

(Section IV, Chapter 40 of Agenda 21)

In sustainable development, the need for information arises at all levels, from that of senior national and international decision-makers to the grass-roots and individual levels.

The gap in the availability, quality, coherence, standardization and accessibility of data between the developed and the developing world has been increasing. This has seriously impaired the capacities of countries to make informed decisions concerning environment and development.

There is also a need for better collection and assessment of data and for improved coordination among environmental, social, demographic and developmental data, and information activities.

Commonly used indicators such as gross national product (GNP) and measurements of individual resource or pollution flows do not provide adequate indications of sustainability.

Proposals for bridging this data gap include:

- Creating indicators for sustainable development to provide solid bases for decision-making at all levels. These should be used in satellite accounts and eventually in national accounts. The Statistical Office of the United Nations can be helpful in this.

- Improving data collection and analysis. Countries and organizations should carry out inventories of environmental, resource and developmental data. They should make use of new techniques of data collection, such as satellite-based remote sensing.

- Making the necessary institutional changes at the national level so that Governments can integrate environment and development information.

- Strengthening programmes such as the Global Environmental Monitoring Systems (GEMS) and the Global Resource Information Database (GRID) and other systems in the UN's Earthwatch programme. A United Nations "Development Watch" programme might be considered.

- Developing guidelines and mechanisms for the rapid and continuous transfer of data-collection and information technologies to developing countries, and for related training.

Agenda 21 contains proposals for improving information availability. There is a wealth of data and information that could be used for sustainable development. Such information is not adequately managed because of lack of personnel, funding, technology and often the awareness that the information is valuable. Extensive capacity-building is required.

International grants and concessional financing needed to improve the collection, analysis and dissemination of data is estimated at \$2.1 billion per year from 1993 to 2000.

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